Installation and Operation Manual

3-Way Mixing and 4-Way Mixing Radiant Motorized Valves

Radiant Motorized Valves

⚠ WARNING

The Heat-Timer valves and actuators are strictly for controlling the heating medium; they should never be used as primary limits or safety controls. All equipment must have its own certified limit and safety controls required by local codes. The installer must verify proper operation and correct any safety problems prior to the installation of this Heat-Timer control.

HEAT-TIMER® CORPORATION

HT# 059267-00A

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Installation Steps

- Select the valve size and piping based on an engineer or professional calculation. This shall designate the valve ports and their use.
- Pipe the valve
- Assemble the actuator/motor and the valve. Then wire the Actuator to the heating control.

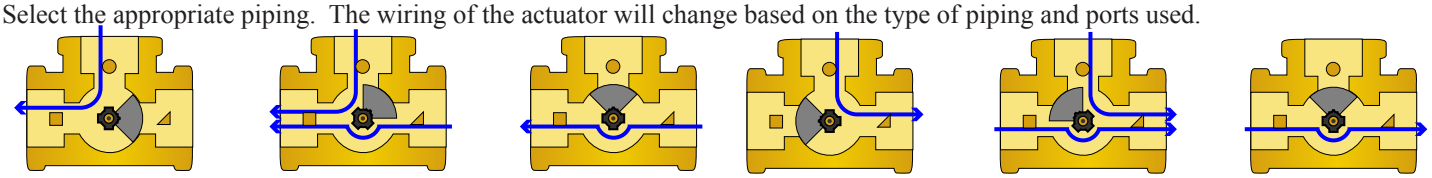
3-Way Motorized Valve Overview

The 3-Way Motorized Valve can be used in a variety of applications. This manual will describe its use in heating applications only.

Mixing

In radiant applications, 3-way motorized valves can be used to mix the hot water from the boiler loop with the heating loop return to regulate the heating loop supply temperature.

Select the appropriate piping. The wiring of the actuator will change based on the type of piping and ports used.



A. PORTS: Hot Port = ●
Return Port = ◢
Mixed Port = ■
DIRECTION: Clock-Wise (CW)= Increase Mixed Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Close on Control
Brown Connects to Open on Control

B. PORTS: Hot Port = ◢
Return Port = ●
Mixed Port = ■
DIRECTION: Counter Clock-Wise (CCW) = Increase Mixed Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Open on Control
Brown Connects to Close on Control

C. PORTS: Hot Port = ■
Return Port = ●
Mixed Port = ◢
DIRECTION: Clock-Wise (CW) = Increase Mixed Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Close on Control
Brown Connects to Open on Control

D. PORTS: Hot Port = ●
Return Port = ■
Mixed Port = ◢
DIRECTION: Counter Clock-Wise (CCW) = Increase Mixed Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Open on Control
Brown Connects to Close on Control

Diverting

In addition to mixing, the 3-Way Motorized Valves can be used as diverting valves in boiler protection installations where some of the boiler output will be diverted back to the boiler to protect the boiler from critical low return temperatures.

E. PORTS: System Return Port = ◢
System Supply Port = ●
To Boiler Port = ■
DIRECTION: Clock-Wise (CW) = Increase Return Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Close on Control
Brown Connects to Open on Control

F. PORTS: System Return Port = ◢
System Supply Port = ■
To Boiler Port = ●
DIRECTION: Counter Clock-Wise (CCW) = Increase Return Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Open on Control
Brown Connects to Close on Control

G. PORTS: System Return Port = ■
System Supply Port = ◢
To Boiler Port = ●
DIRECTION: Clock-Wise (CW) = Increase Return Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Close on Control
Brown Connects to Open on Control

H. PORTS: System Return Port = ■
System Supply Port = ●
To Boiler Port = ◢
DIRECTION: Counter Clock-Wise (CCW) = Increase Return Temperature
WIRING: Blue Connects to 24VAC from Control
Black Connects to Open on Control
Brown Connects to Close on Control

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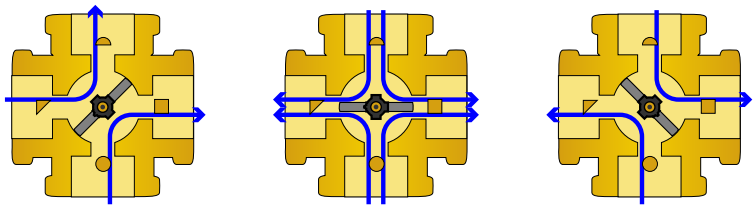
4-Way Motorized Valve Overview

The 4-Way Motorized Valve can be used in heating applications. This manual will describe its use in heating applications only.

Mixing

They can be used as mixing valves in heating installations, as in radiant applications, where they will mix the hot water from the boiler loop with the return to adjust the temperature of mixed output. Each of the primary and secondary loops must have a circulating pump.

The 4-Way Motorized Valve can be installed in different directions. The following are some of the flow directions that these valves can satisfy. The wiring of the actuator will change based on the type of piping and ports used.



A. PORTS: Boiler Hot Port =
Boiler Return Port =
Heating Supply Port =
Heating Return Port =

DIRECTION: Clock-Wise (CW) = Increase Mixed Temperature

WIRING: Blue Connects to 24VAC from Control
Black Connects to Close on Control
Brown Connects to Open on Control

B. PORTS: Boiler Hot Port =
Boiler Return Port =
Heating Supply Port =
Heating Return Port =

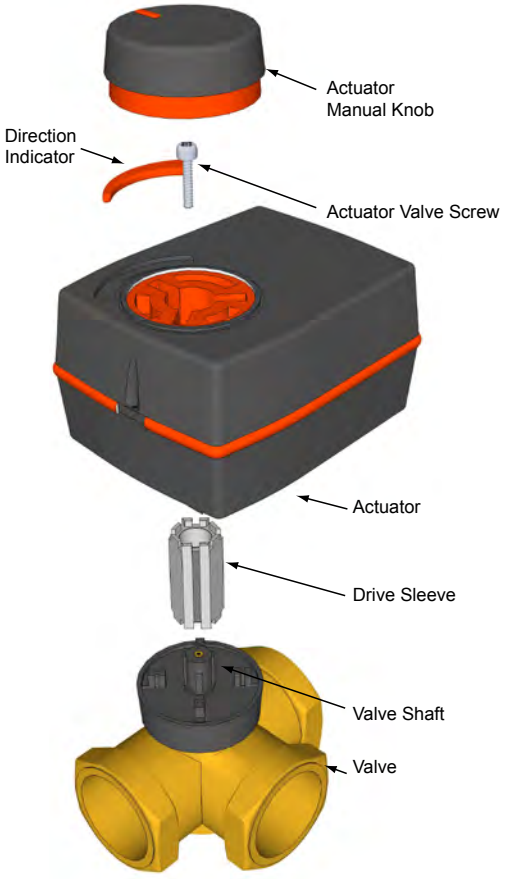
DIRECTION: Counter Clock-Wise (CCW) = Increase Mixed Temperature

WIRING: Blue Connects to 24VAC from Control
Black Connects to Open on Control
Brown Connects to Close on Control

Assembling Valves and Actuators

½" - 2" Valve Assembly

- Select the direction of the Valve opening. See "3-Way Motorized Valve Overview" on page 3 and "4-Way Motorized Valve Overview" on page 4.
- Start with the valve in the closed position.
- The Drive Sleeve's two different ends are designed for different types of valves. Choose the end with the corrugated internal end to connect to the Valve Shaft. Observe the direction of Valve Shaft webbed side and the Drive Sleeve grooved side.
- Mount the actuator to the Drive Sleeve.
- Drive the Actuator Valve Screw in the actuator Manual Knob opening. This will hold the actuator to the valve.
- Mount the Direction Indicator to the Actuator, observing the valve opening direction. Make sure to observe the Actuator Manual Knob indicator. The knob must be in the closed position as well.
- Snap the Actuator Manual Knob to the Actuator to lock the knob in place.



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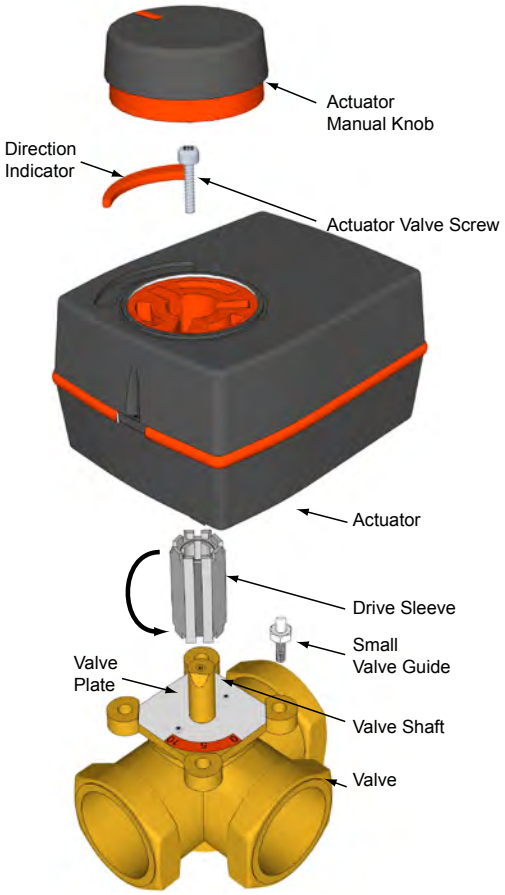
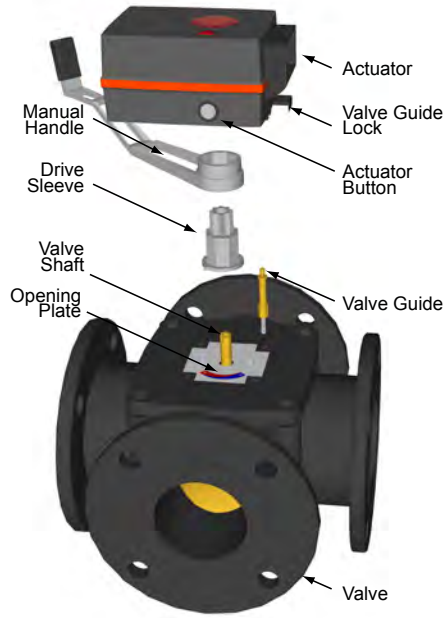
½” - 2” Old Style Valve Assembly

- Older style valves can be used with the new actuator/motor. In this scenario, the opposite end of the Drive Sleeve must match the Valve Shaft.
- Start with the valve in the closed position.
- The Drive Sleeve’s two different ends are designed for different types of valves. Choose the end with the smooth internal end to connect to the Valve Shaft.
- Insert the Drive Sleeve to the Valve Shaft, observe the direction of Valve Shaft grooved side. The grooved side must face the Valve Shaft’s sloped side.
- Mount and thread the Small Valve Guide to one of the Valve square plate corners.
- Mount the actuator to the Drive Sleeve.
- Drive the Actuator Valve Screw in the actuator Manual Knob opening. This will hold the actuator to the valve.
- Mount the Direction Indicator to the Actuator, observing the valve opening direction. Make sure to observe the Actuator Manual Knob indicator. The knob must be in the closed position as well.
- Snap the Actuator Manual Knob to the Actuator to lock the knob in place.



2½” - 4” 4-Way Large Valve Assembly

- Larger 4-way flanged valves require the use of a different actuator.
- Insert the Drive Sleeve to the Valve Shaft, observe direction of Drive Sleeve Arrow.
- Mount the Manual Handle to the Drive Sleeve. Then, close the valve. The Drive Sleeve’s Arrow must point to the Opening Plate’s “0” position.
- Mount and thread the Valve Guide to the Valve.
- Pull the Valve Guide Lock to allow for the actuator mounting.
- Mount the actuator to the Drive Sleeve observing the alignment of the Valve Guide and the Valve Guide Lock.
- When they are aligned, push and hold the Actuator Button down while pushing the Actuator towards the Valve.
- Then lock the Actuator Guide Lock to secure the actuator in place.



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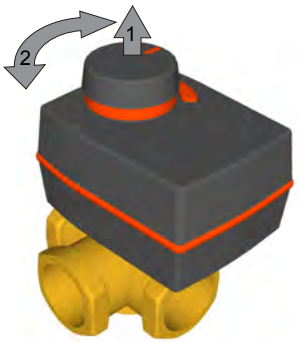
Valve Manual Operation

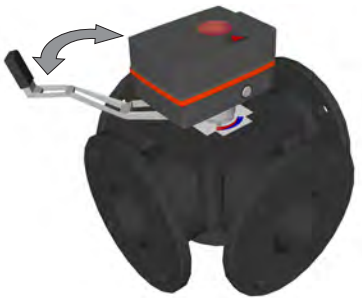
½” - 2” Valves

- To operate the actuator/motor manually, disconnect the power to the actuator.
- Then, pull the Actuator Manual Knob until its orange ring shows.
- Turn the Actuator Manual Knob to the desired position.



2½” - 4” Valve

- To operate the actuator/motor manually, disconnect the power to the actuator.
- Turn the Manual Handle to the desired position. The Drive Sleeve’s pointer will indicate the valve’s opening position.

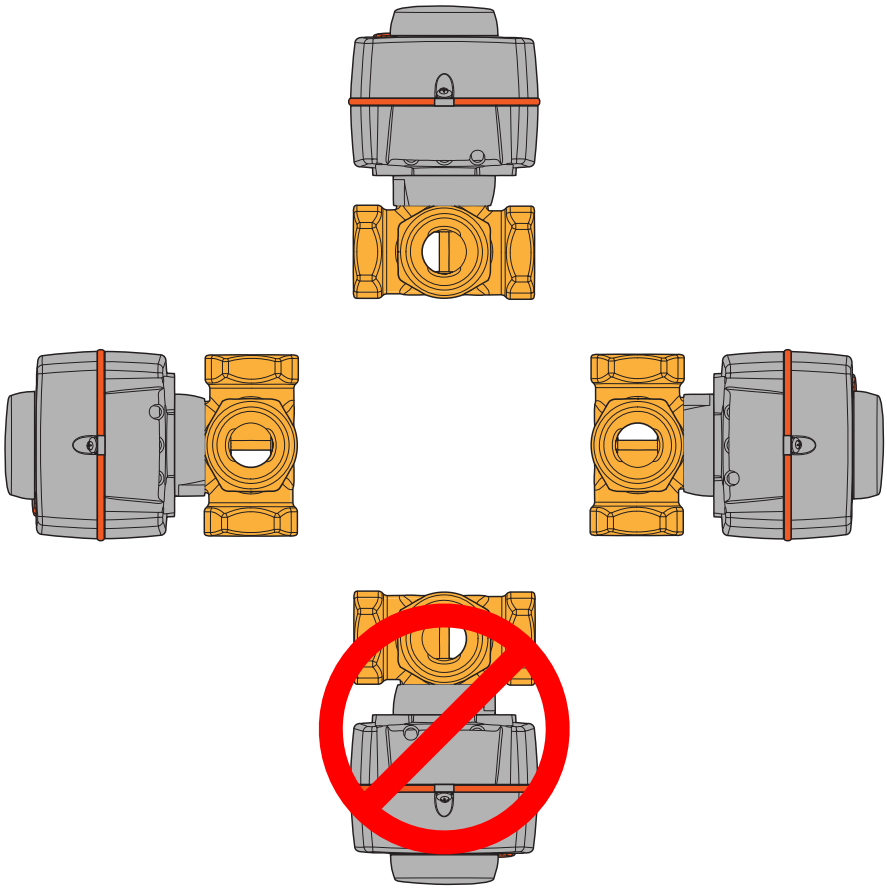


Orientation

- The actuator/motor must be installed either sideway or upright (the actuator/motor above the valve). Do not install the actuator upside down.

⚠ WARNING

The actuator/motor MUST never be installed below the valve. Warranty will not cover actuator damaged by water leakage.



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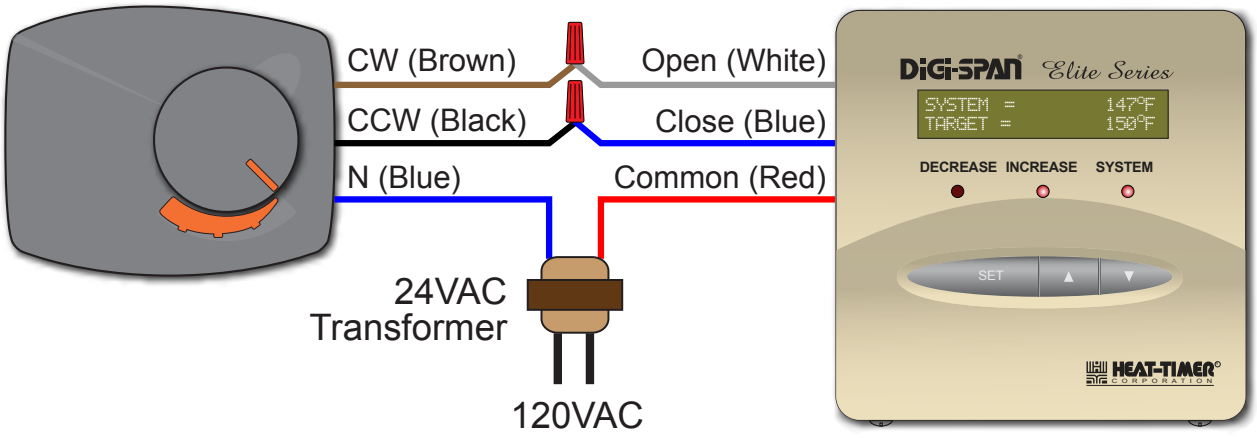
Actuator Wiring (½” - 2” Valves)

Actuator Clock-Wise (CW) = Increase Temperature Wiring

- The actuator requires a floating 24 VAC signal.
- Connect the Actuator Brown wire (CW) to the control’s Open terminal (HWE-MOV or MCF White wire).
- Connect the Actuator Black wire (CCW) to the control’s Close terminal (HWE-MOV or MCF Blue wire).
- Connect the Actuator Blue wire (N) to the transformer 24VAC terminal.
- The transformer’s other output terminal must be connected to the control’s Common terminal (HWE-MOV or MCF Red wire).

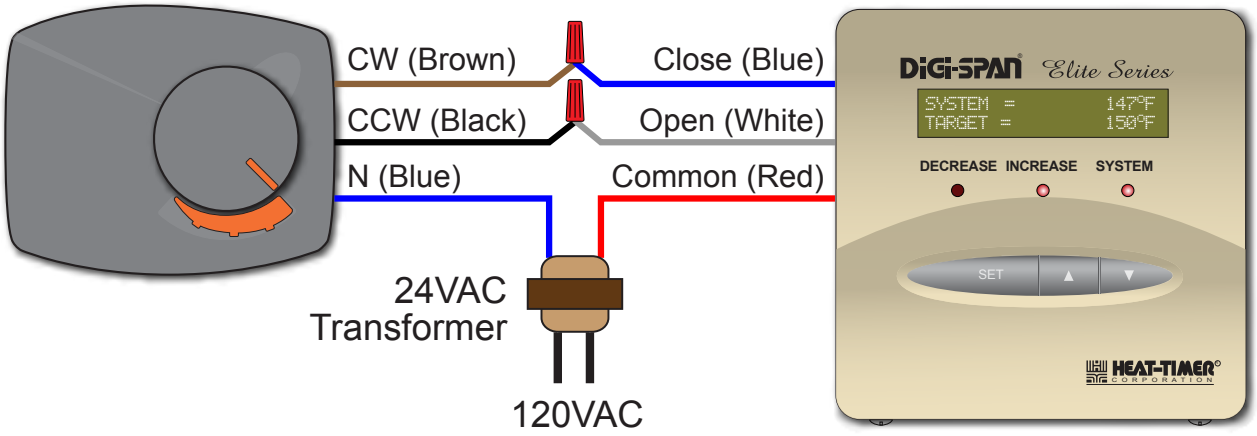


⚠ ALERT

Heat-Timer recommends installing an isolation switch prior to the transformer. This shall ease valve manual operation.

Actuator Counter Clock-Wise (CCW) = Increase Temperature Wiring

- The actuator requires a floating 24 VAC signal.
- Connect the Actuator Black wire (CCW) to the control’s Open terminal (HWE-MOV or MCF White wire).
- Connect the Actuator Brown wire (CW) to the control’s Close terminal (HWE-MOV or MCF Blue wire).
- Connect the Actuator Blue wire (N) to the transformer 24VAC terminal.
- The transformer’s other output terminal must be connected to the control’s Common terminal (HWE-MOV or MCF Red wire).



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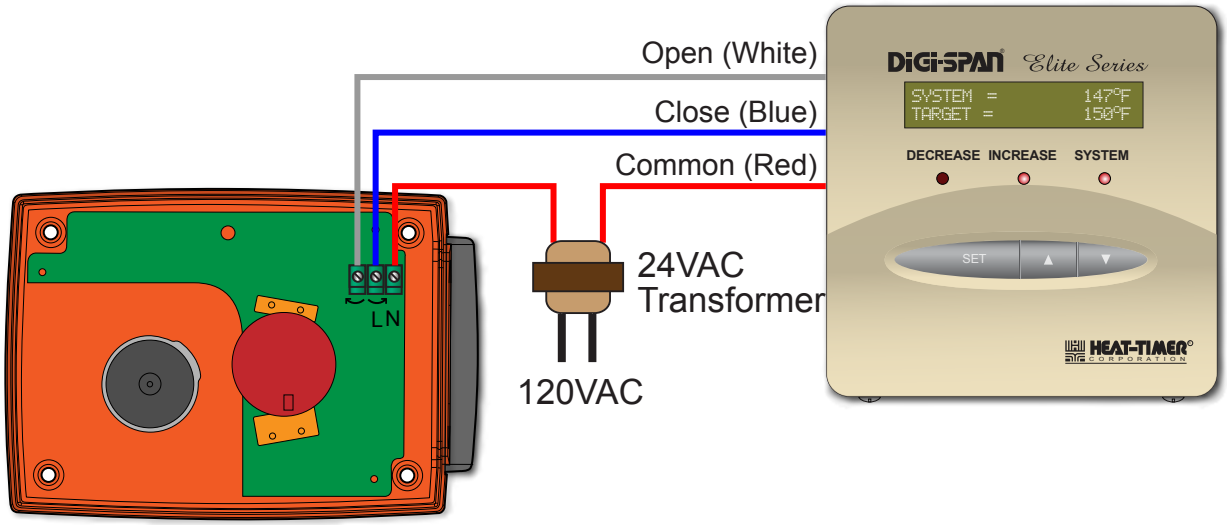
Actuator Wiring (2½” - 4” Valves)

Actuator Clock-Wise (CW) = Increase Temperature Wiring

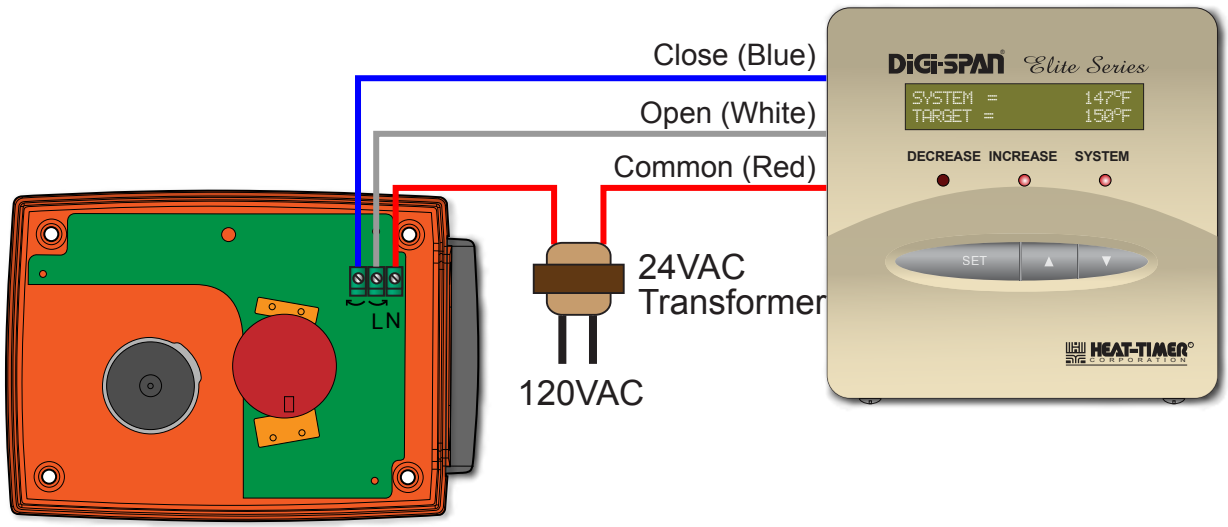
- The actuator requires a floating 24 VAC signal.
- Connect the Actuator ↷ (CCW terminal) to the control’s Open terminal (HWE-MOV or MCF White wire).
- Connect the Actuator ↶ (CW terminal) to the control’s Close terminal (HWE-MOV or MCF Blue wire).
- Connect the Actuator N terminal to the transformer 24VAC terminal.
- The transformer’s other output terminal must be connected to the control’s Common terminal (HWE-MOV or MCF Red wire).



⚠ ALERT
Heat-Timer recommends installing an isolation switch prior to the transformer. This shall ease valve manual operation.

Actuator Counter Clock-Wise (CCW) = Increase Temperature Wiring

- The actuator requires a floating 24 VAC signal.
- Connect the Actuator ↶ (CW terminal) to the control’s Open terminal (HWE-MOV or MCF White wire).
- Connect the Actuator ↷ (CCW terminal)to the control’s Close terminal (HWE-MOV or MCF Blue wire).
- Connect the Actuator N terminal to the transformer 24VAC terminal.
- The transformer’s other output terminal must be connected to the control’s Common terminal (HWE-MOV or MCF Red wire).



Piping Diagrams

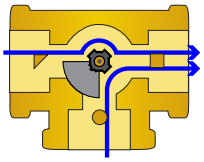
3-Way Mixing Primary Secondary Piping

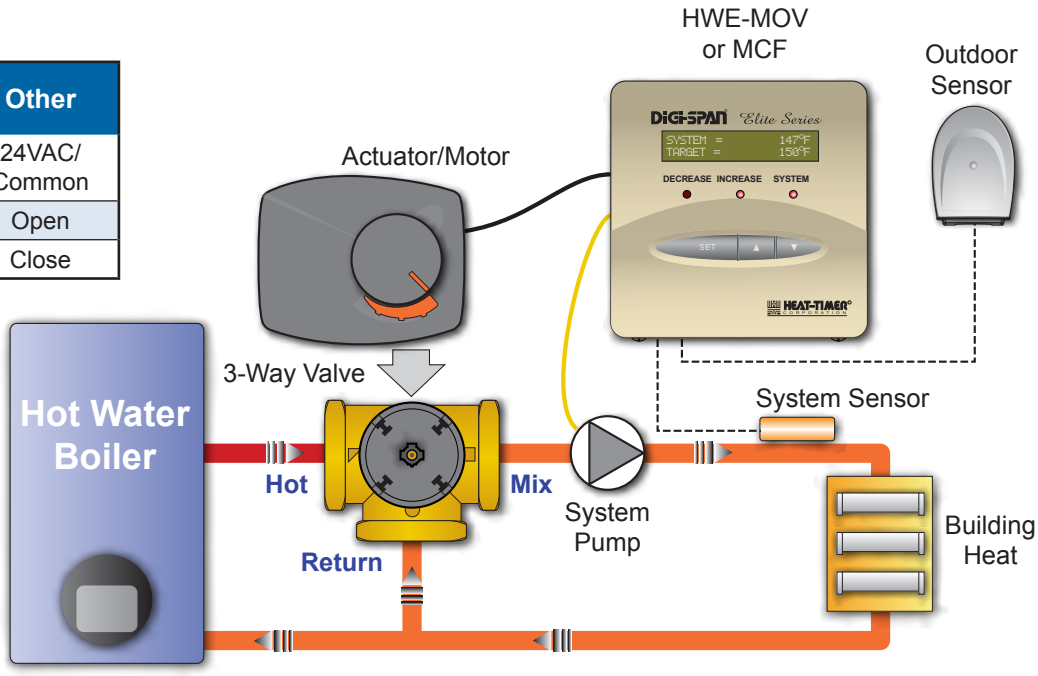
Increase Temp = Actuator Turn Counter Clock-Wise (CCW)

(Open Hot Port ◢ + Close Return port ●)

Wiring:

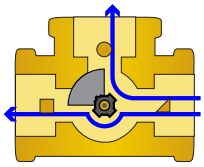
Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	White	Open
Brown	Blue	Close

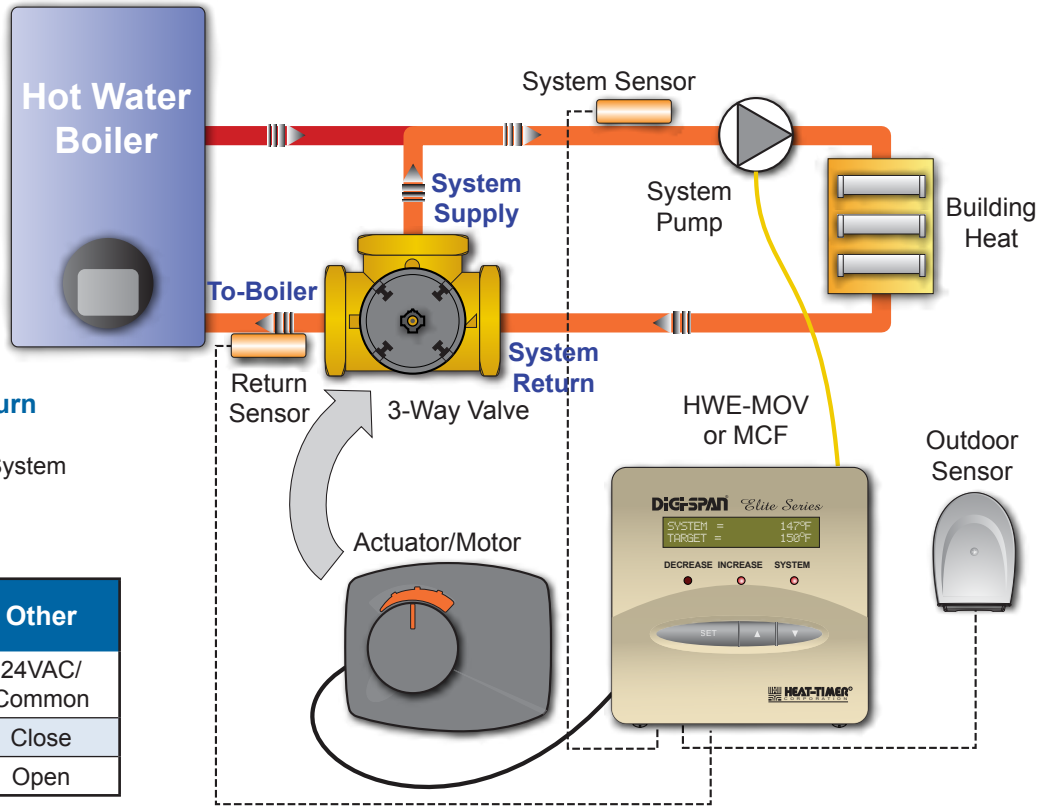




3-Way Diverting Primary Secondary Piping

Used with Return Sensor to protect Boiler from Low Return temperatures





Increase Temp = Actuator Turn Clock-Wise (CW)

(Open To-Boiler Port ■ + Close System Supply port ●)

Wiring:

Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	Blue	Close
Brown	White	Open

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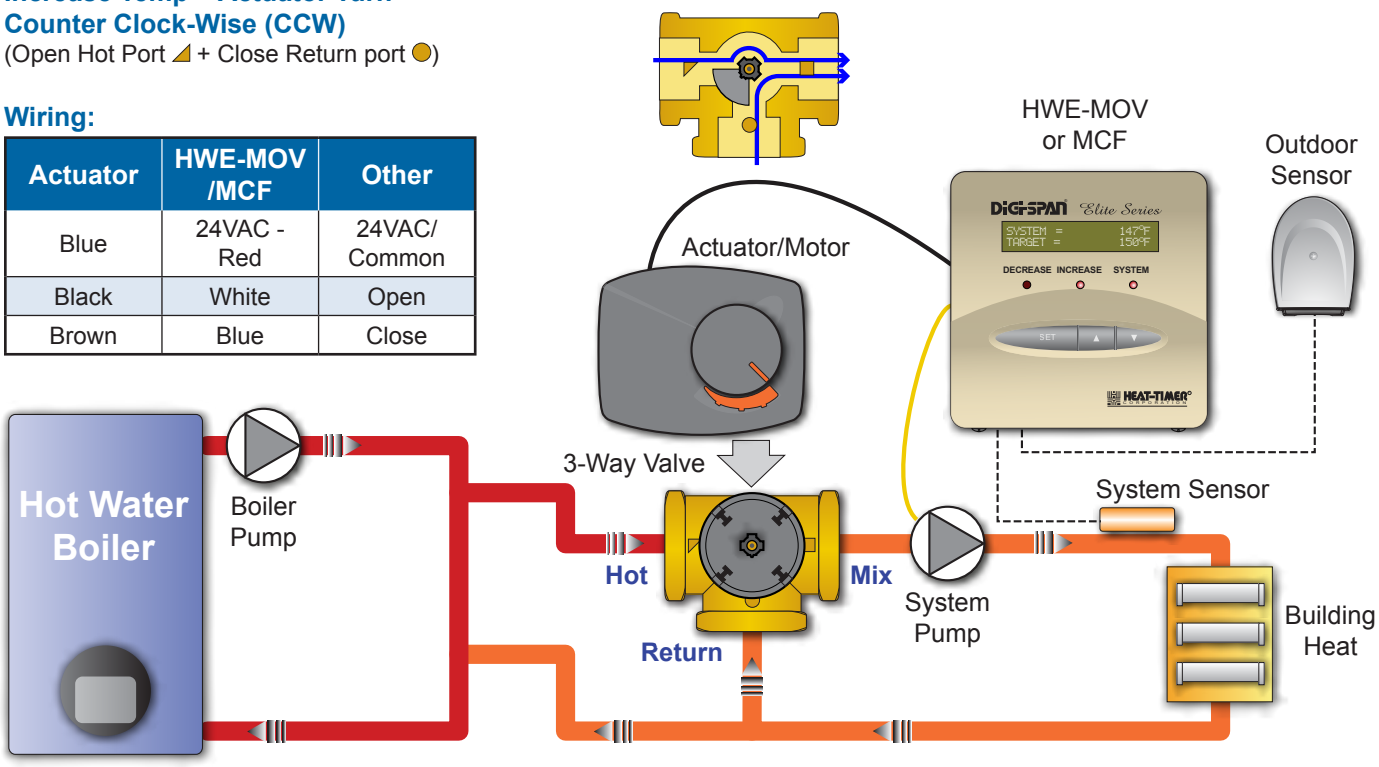
3-Way Mixing Injection Piping

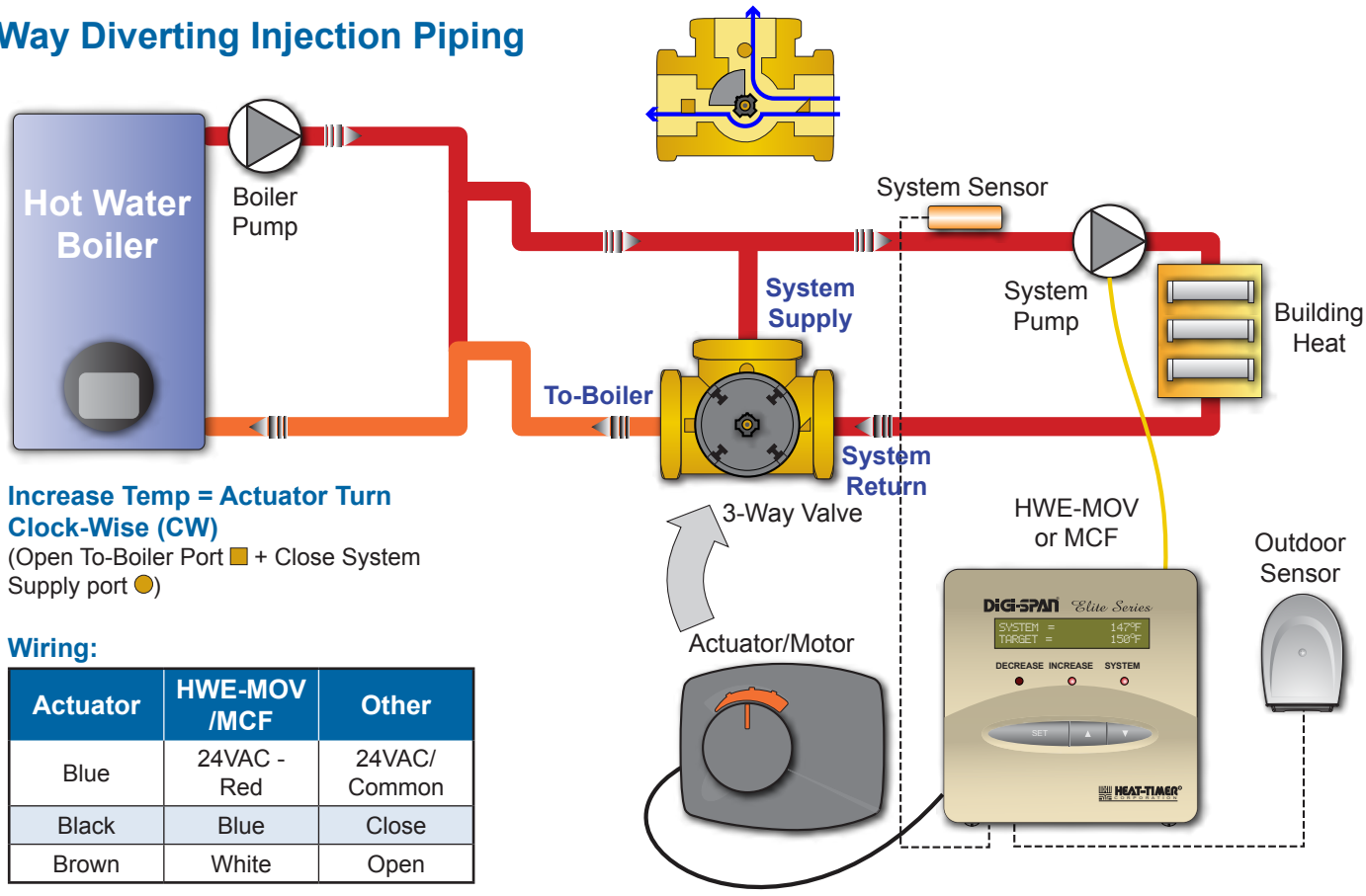
Increase Temp = Actuator Turn Counter Clock-Wise (CCW)
(Open Hot Port ◢ + Close Return port ●)

Wiring:

Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	White	Open
Brown	Blue	Close



3-Way Diverting Injection Piping



Increase Temp = Actuator Turn Clock-Wise (CW)
(Open To-Boiler Port ■ + Close System Supply port ●)

Wiring:

Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	Blue	Close
Brown	White	Open

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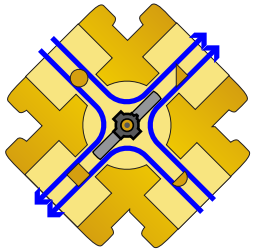
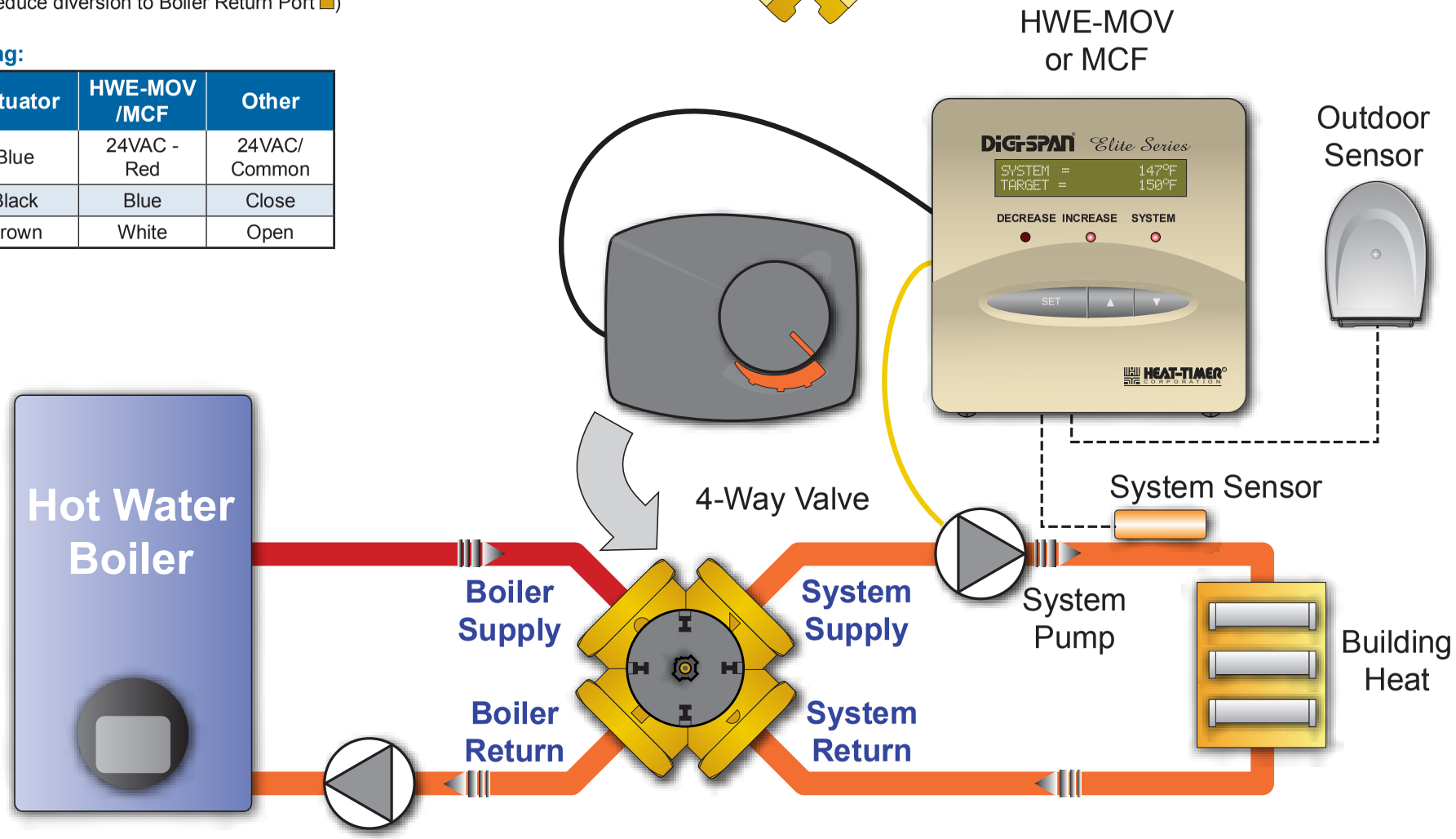
4-Way Diverting Injection Piping



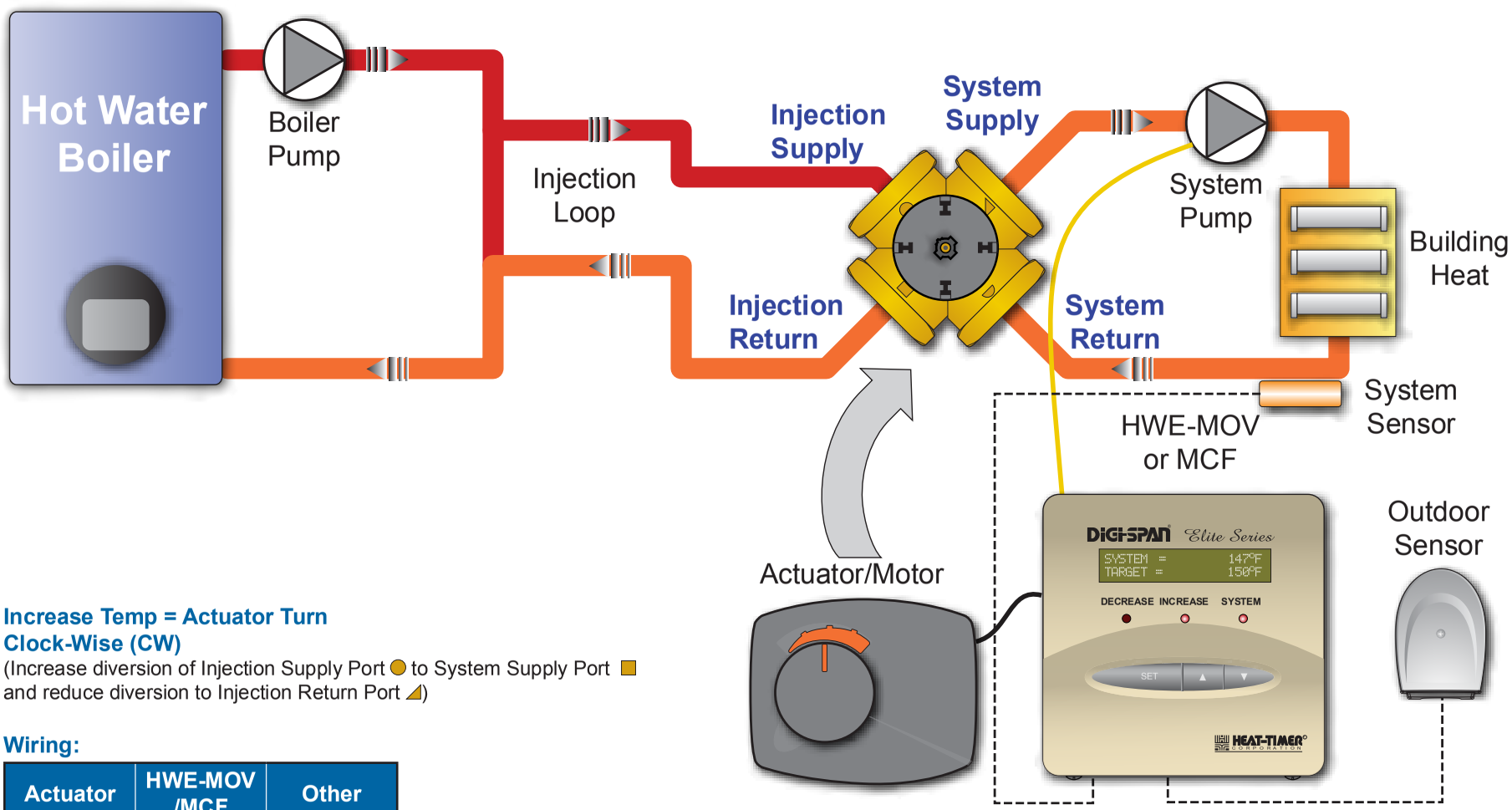
Increase Temp = Actuator Turn Clock-Wise (CW)
(Increase diversion of Boiler Supply Port ● to System Supply Port ◢ and reduce diversion to Boiler Return Port ■)

Wiring:

Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	Blue	Close
Brown	White	Open



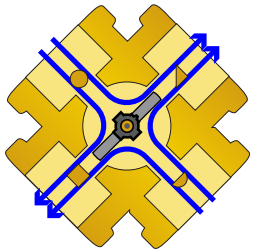
4-Way Mixing Injection Piping



Increase Temp = Actuator Turn Clock-Wise (CW)
(Increase diversion of Injection Supply Port ● to System Supply Port ■ and reduce diversion to Injection Return Port ◢)

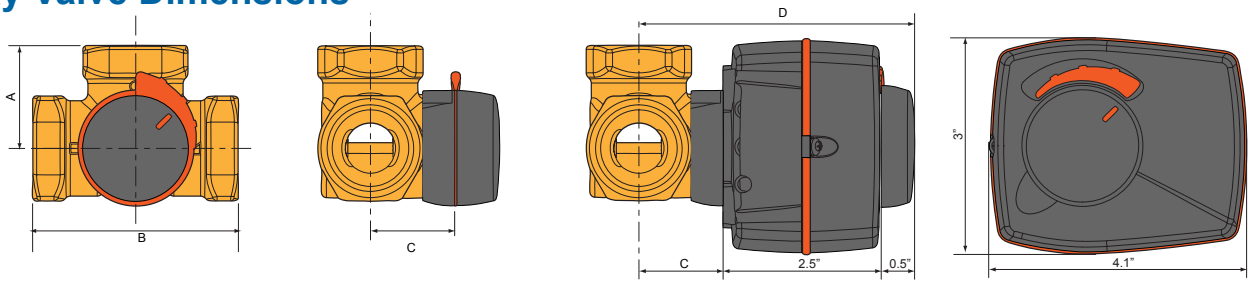
Wiring:

Actuator	HWE-MOV /MCF	Other
Blue	24VAC - Red	24VAC/ Common
Black	Blue	Close
Brown	White	Open



Dimensions

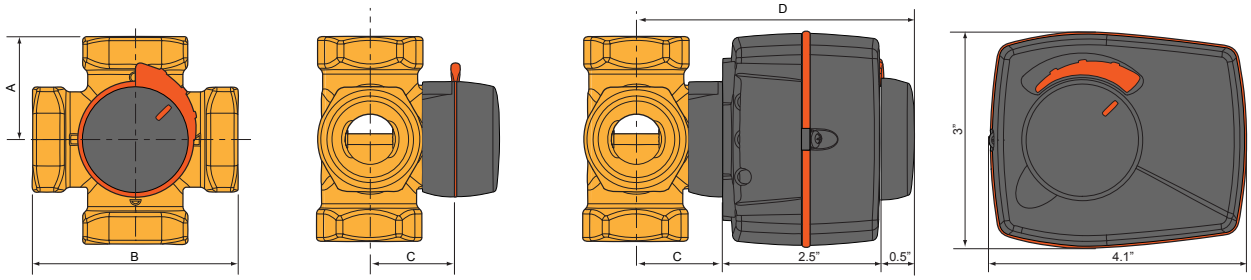
3-Way Valve Dimensions



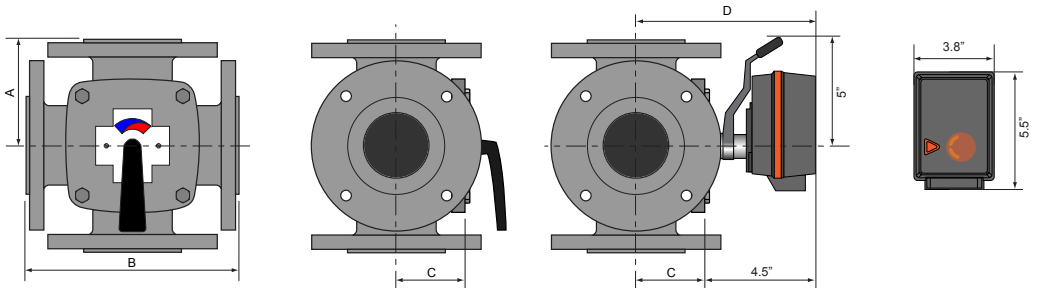
Part #	Type	Pipe Size	C_v	Mount	Body	Max Temp °F /°C	Dimensions (Inches)				Actuator (Included)	Total Weight Lbs
							A	B	C	D		
928500-00	3-Way	½"	2.9	NPT	Brass	230/110	1.42	2.83	1.26	4.26	400100-00	1.9
928501-00	3-Way	¾"	7.3	NPT	Brass	230/110	1.42	2.83	1.26	4.26	400100-00	2.0
928502-00	3-Way	1"	11.7	NPT	Brass	230/110	1.61	3.23	1.34	4.34	400100-00	2.6
928503-00	3-Way	1¼"	18.7	NPT	Brass	230/110	1.85	3.70	1.46	4.46	400100-00	3.1
928504-00	3-Way	1½"	29.3	NPT	Brass	230/110	2.09	4.17	1.73	4.73	400100-00	4.7
928505-00	3-Way	2"	46.8	NPT	Brass	230/110	2.36	4.72	1.81	4.81	400100-00	6.1

4-Way Valve Dimensions

4-Way ¾" - 2"



4-Way 2½" - 4"



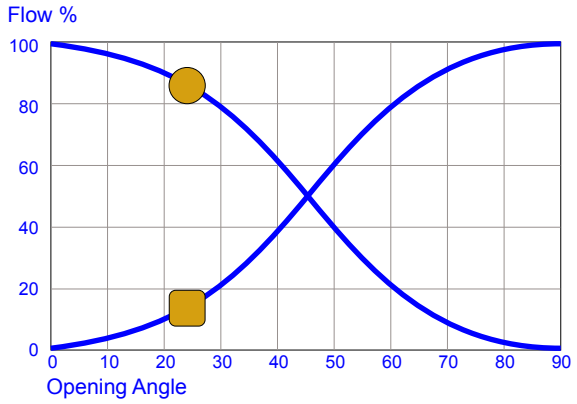
Part #	Type	Pipe Size	C_v	Mount	Body	Max Temp °F /°C	Dimensions (Inches)				Actuator (Included)	Total Weight Lbs
							A	B	C	D		
928401-00	4-Way	¾"	7.3	NPT	Brass	230/110	1.42	2.83	1.26	4.26	400100-00	2.2
928402-00	4-Way	1"	9.3	NPT	Brass	230/110	1.61	3.23	1.34	4.34	400100-00	2.8
928403-00	4-Way	1¼"	21	NPT	Brass	230/110	1.85	3.70	1.46	4.46	400100-00	3.4
928404-00	4-Way	1½"	35	NPT	Brass	230/110	2.09	4.17	1.73	4.73	400100-00	5.2
928405-00	4-Way	2"	50	NPT	Brass	230/110	2.36	4.72	1.81	4.81	400100-00	6.7
928406-00	4-Way	2½"	115	4-DIN♦	Iron	230/110	3.9	7.9	2.0	6.5	400201-00♦♦	29
928407-00	4-Way	3"	175	4-DIN♦	Iron	230/110	4.7	9.4	2.6	7.1	400201-00♦♦	46
928408-00	4-Way	4"	265	4-DIN♦	Iron	230/110	5.2	10.4	3.2	7.7	400201-00♦♦	57

♦ 4 Din-Flanges Included
♦♦ Actuator Operates 4-Way 2-½ Valves and Larger

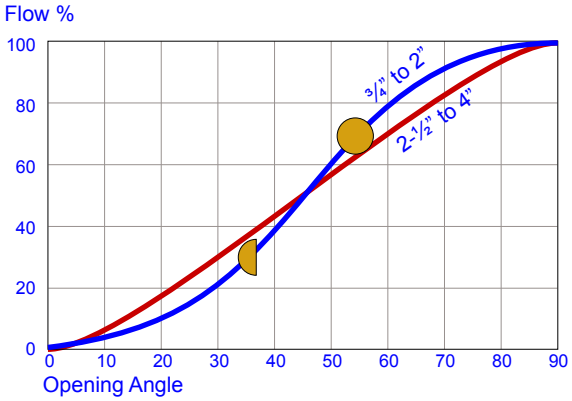
HT# 059267-00A

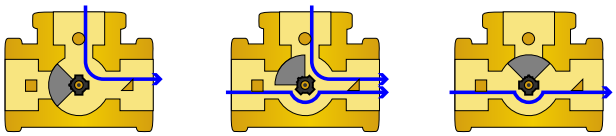
Valve Flow Characteristics

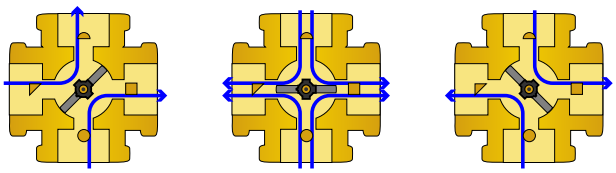
3-Way ½” - 2”



4-Way ¾” - 4”

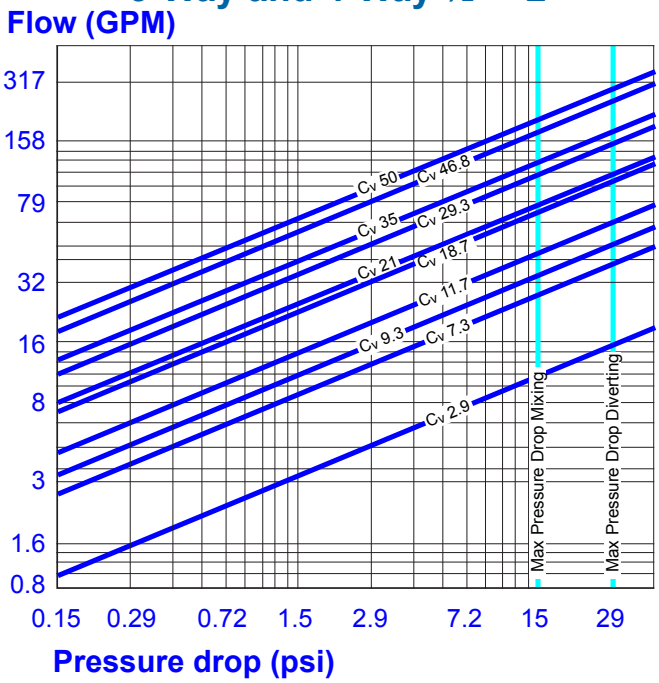




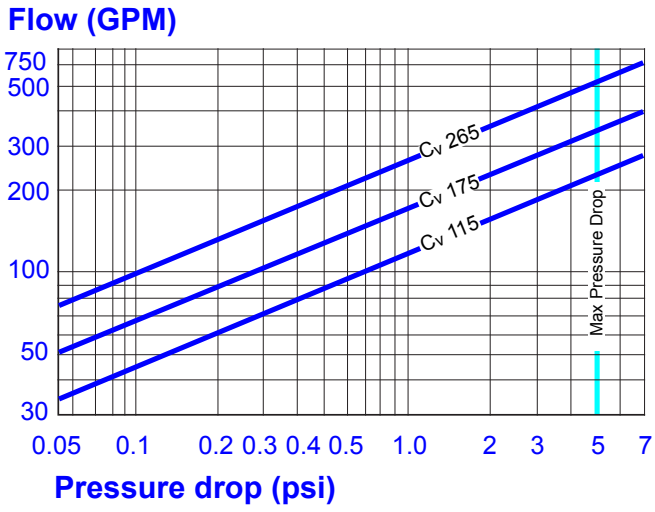


Valve Pressure Drop Characteristics

3-Way and 4-Way ½” - 2”



4-Way 2½” - 4”



HT# 059267-00A

Valve Specifications

Acceptable Medium . . . . . Water, Glycol Water up to 50%
Valve Cv and Dimensions . . . . . See “Dimensions” on page 13

⚠ WARNING
Valves CANNOT be used with fluids that contain mineral oil or chlorinated pool water.

3-Way Valve

Valve Body . . . . . Brass DZR
Connection . . . . . NPT
Medium Temperature. . . . . 5°F/-15°C to 230°F/110°C
Maximum Operating Pressure . . . . . 145 PSI

4-Way Valve ¾” - 2”

Valve Body . . . . . Brass DZR
Connection . . . . . NPT
Medium Temperature. . . . . 5°F/-15°C to 230°F/110°C
Maximum Operating Pressure . . . . . 145 PSI

4-Way Valve 2½” - 4”

Valve Body . . . . . Cast Iron
Connection . . . . . Din Flange (4 Flanges included)
Stem . . . . . Stainless Steel
O-Ring . . . . . EPDM
Medium Temperature. . . . . 14°F/-10°C to 230°F/110°C
Maximum Operating Pressure . . . . . 87 PSI

Floating Actuator Specifications

Actuator for ½” - 2” Valves (HT# 400100-00)

Operating Temperature. . . . . 23°F/-5°C to 131°F/55°C
Power Supply . . . . . 24 VAC 60 Hz ± 10%
Relay Minimum Requirement . . . . . 2 VA at 24 VAC
Input Signal. . . . . Floating
Rotation . . . . . 90° Rotation
Torque . . . . . 53 in.Lb
Run Time . . . . . 2 minutes (60Hz)
Enclosure Rating . . . . . IP 54
Weight . . . . . 1 Lb

Actuator for 2½” - 4 Valves (HT# 400201-00)

Operating Temperature. . . . . 5°F/-15°C to 131°F/55°C
Power Supply . . . . . 24 VAC 60 Hz ± 10%
Relay Minimum Requirement . . . . . 2 VA at 24 VAC
Input Signal. . . . . Floating
Rotation . . . . . 90° Rotation
Torque . . . . . 135 in.Lb
Run Time . . . . . 4 minutes (60Hz)
Enclosure Rating . . . . . NEMA 13, IP 54
Weight . . . . . 1.8 Lb

HT# 059267-00A

Warranty

WARRANTIES AND LIMITATIONS OF LIABILITY AND DAMAGE: Heat-Timer Corporation warrants that it will replace, or at its option, repair any Heat-Timer Corporation manufactured product or part thereof which is found to be defective in material workmanship within one year from the date of installation only if the warranty registration has been properly filled out and returned within 30 days of the date of installation. Damages to the product or part thereof due to misuse, abuse, improper installation by others or caused by power failure, power surges, fire, flood or lightning are not covered by this warranty. Any service, repairs, modifications or alterations to the product not expressly authorized by Heat-Timer Corporation will invalidate the warranty. Batteries are not included in this warranty. This warranty applies only to the original user and is not assignable or transferable. Heat-Timer Corporation shall not be responsible for any maladjustments of any control installed by Heat-Timer Corporation. It is the users responsibility to adjust the settings of the control to provide the proper amount of heat or cooling required in the premises and for proper operation of the heating or cooling system. Heat-Timer Corporation shall not be required to make any changes to any building systems, including but not limited to the heating system, boilers or electrical power system, that is required for proper operation of any controls or other equipment installed by Heat-Timer Corporation or any contractor. Third Party products and services are not covered by this Heat-Timer Corporation warranty and Heat-Timer Corporation makes no representations or warranties on behalf of such third parties. Any warranty on such products or services is from the supplier, manufacturer, or licensor of the product or service. See separate Terms and Conditions of Internet Control Management System (“ICMS”) services, including warranties and limitations of liability and damages, for ICMS services.

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WID. 03012010

HT# 059267-00A

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